RFCA Stakeholder Focus Group
September 5, 2001
Meeting Minutes

INTRODUCTION AND ADMINISTRATIVE

A participants list for the September 5, 2001 Rocky Flats Cleanup Agreement (RFCA) Stakeholder Focus Group meeting is included in this report as Appendix A.

Reed Hodgin of AlphaTRAC, Inc., meeting facilitator, reviewed the purpose of the RFCA Stakeholder Focus Group and reinforced the meeting rules. Introductions were made.

AGENDA

Reed reviewed the agenda:

- Briefing on New Results in the RSAL Modeling Matrix
  - New modeling results
  - Sensitivity of results to key input parameters
- RSALs Task 3: Continued Technical Discussion
  - Mass loading questions
  - Exposure frequency and duration
  - Safety factors and conservatism
  - Other technical questions from question list
- RSALs Task 3: Continued Technical Discussion
  - Soil Ingestion Rate
- Frame the Policy Discussion for Next Focus Group Meeting

BRIEFING ON NEW RESULTS IN THE RSAL MODELING MATRIX

Tim Rehder, U.S. Environmental Protection Agency (EPA), stated that there were no new results to present on the Radioactive Soil Action Level (RSAL) modeling matrix. Susan Griffin, EPA, will continue work on it and anticipates releasing the results within ten days.

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Steve Gunderson of the Colorado Department of Public Health and Environment (CDPHE) stated that the RSALs Working Group is compiling written sections for the Task 3 report and is targeting a deadline of September 7, 2001.

RSALS TASK 3: CONTINUED TECHNICAL DISCUSSIONS

The group engaged in a question and answer session on the following topics:

- Mass loading; and
- Exposure Frequency and Duration.

Mass Loading Discussion

Questions on the following topics were discussed, with Kaiser-Hill Company, LLC, CDPHE, and EPA providing technical responses.

- Standards for resuspension,
- Frequency of fires,
- Peer-review of wind tunnel technology,
- Variations in particulate concentration,
- Values for mass loading, and
- Soil ingestion input values.

Standards for Resuspension

Jerry Henderson of the Rocky Flats Citizens Advisory Board (RFCAB) asked if a sophisticated dust resuspension model was being developed for the actinide migration evaluation work, and if so, could it be used to benchmark the RSAL results for the inhalation pathway.

Bob Nininger of Kaiser-Hill Company, LLC stated that the actinide migration evaluation was making progress this year, and in the short-term, the model was using Industrial Source Complex (ISC) inputs and inputs from the wind tunnel study, along with other inputs, to develop a future scenario model for Rocky Flats. These data are not considered benchmark data, but may be used for informational purposes. Probability distribution functions (distributions) were developed for the RSAL based on

a median value from statewide data. From there, distributions were modified to include the effects of precipitation, the post-effects of fire, and seasonal implications. These data will be compared to the data points currently being generated for the RSAL. Additionally, data from the wind tunnel study seemed to be the best resuspension data available for Rocky Flats. Again, full distribution data will not be available from the actinide migration evaluation.

Frequency of Fires

LeRoy Moore, Rocky Mountain Peace & Justice Center (RMPJC), asked for an explanation and rationale for the methodology used for the frequency of a major grass fire at Rocky Flats in comparison to the approach used by the RAC.

Bob Nininger, Kaiser-Hill, reminded the Focus Group that when dose calculations were being developed, the timeframe was based on one year. Distributions were then used involving some of the variables of that particular exercise. From there, the frequency was established at the 95th percentile. The dose calculations that correspond to the mass loading in the fire scenario were evaluated at the 95th percentile. It is not believed that this approach differed from that of the RAC.

Peer-review of Wind Tunnel Study

LeRoy Moore of RMPJC inquired about the wind tunnel study and the reliability of the results, since its methods of measurement and calibration have not been peer reviewed. RMPJC wanted to know what the course of action is if the peer review recommends major changes, or if the peer review concludes that the wind tunnel technology cannot produce reliable data for RSAL calculations.

Bob Nininger of Kaiser-Hill briefly reviewed the actual events of the wind tunnel study. The first data were collected the day after the test burn in the southwestern buffer zone and emission rates were evaluated. Next, at some other point in time, data were collected from the same general area that was only naturally disturbed. Nearly one month later, another emissions test was conducted. Analysis of these three data sets can reveal the recovery behavior after a burn. The author of the wind tunnel study, Dr. Chatten Cowherd, Midwest Research Institute, developed mathematical curves to further evaluate erosion potential as the surfaces regrow. These calculations include

weather conditions, seasonal differences, and the effects of non-revegetation. These are variables considered as part of the distribution of mass loading.

Reed Hodgin, facilitator, added that the peer review process is underway. Four peer review candidate names have been submitted thus far.

A Focus Group member suggested that there were several technical issues that needed to be addressed with regard to the wind tunnel study. These issues ranged from the characteristics of the duct used in the study to the volume, time, and velocity of the material being transported.

CDPHE defended the study, and the fact that Dr. Cowherd had a solid international reputation. Additionally, John Ciolek, citizen, stated that when studies are eligible for peer review, it is because the study possesses credibility.

Some questions relating to this study were answered during an RFCAB session. Reed suggested the participants read the study in detail, review the notes from the RFCAB session, and revisit how the wind tunnel study can contribute to the additional resuspension that occurs with fire scenarios.

Variations in Particulate Concentration

John Ciolek, citizen, asked about diurnal variations in particulate concentration and if the exposure scenarios accounted for the increased concentrations that occur when the receptor is exposed.

The issue is one that relates to averaging both day and night time data, which will reduce concentrations because, ostensibly, concentrations will be much higher during the day when there is more activity as opposed to lower-activity nights.

Bob Nininger of Kaiser-Hill stated that this study has not directly looked at day and night differences in particulate concentrations. EPA added that this study assumes mass loading remains constant throughout the site, meaning that the content in the soil is constant throughout the site. The RAC modeled plutonium in air concentration based on historical meteorological data. The 903 Pad and the lip area to the east of the pad are of particular importance because there are areas that have concentrations of

hundreds of pCi/g. Area source concentrations fan out from the 903 Pad and the lip area according to the modeling results.

John requested a report back on the difference between day and night time concentration data and how the difference contributes to the total dose.

Values for Mass Loading

John Ciolek, citizen, wanted to understand why higher averaged values were dismissed while developing the "seed" value for mass loading.

John further added that the value is contained in the wind tunnel study, yet the data from Colorado's sampling network were used and averaged.

According to Bob Nininger of Kaiser-Hill, the five state samplers around Rocky Flats were used to determine Rocky Flats concentrations. The seed value was established using all of Colorado's data for a given period available in the AIRS database. A median value was identified (50th percentile) and a distribution around the median value was calculated. There is no evidence that a better distribution would have been available than the approach of using site-specific data against the AIRS database seed value. An appendix in the Task 3 report will further speak to this issue.

John and Bob further discussed the statistical representation of annual average values. The AIRS data demonstrates a spread of ~10$\mu g/m^3$ to ~51-56$\mu g/m^3$, which is above the annual average standard of 50$\mu g/m^3$ for PM^{-10}. Averaging the concentration data for a year at a particular Site derives this annual average. With this in mind, 26$\mu g/m^3$ was used as a median value for the distribution. These site-specific data were used to generate the distribution based on the median value of 26$\mu g/m^3$. As a note, the Site's median value was 11$\mu g/m^3$ and the Site's highest value was ~17$\mu g/m^3$, so the distribution is designed conservatively.

Soil Ingestion Input Values

John Ciolek, citizen, inquired about the maximum value of 100 mg/day for adult soil ingestion used in the Monte Carlo simulation, when the mean and median values in the Calabrese 1990 study are equal to or greater than 100 mg/day.

EPA pointed out that the study was not used due to the small sample size and that EPA uses 100 mg/day as a "reasonable" default if site-specific data are not available. The 100 mg/day is used at all Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) sites and is a policy-level default. It was further noted that the Calabrese study was actually a calibration study for the child soil ingestion rate.

John further inquired about topsoil disturbance and an "enhancement factor." He explained that some studies indicate that when topsoil is disturbed, plutonium in resuspended soil increases.

Bob Nininger of Kaiser-Hill stated that there was slightly higher radioactivity in disturbed burned topsoil than in undisturbed burned topsoil, yet the top surface actually experienced deposition of clean material on a burn area, which actually may require a reduction factor rather than an enhancement factor. A reduction factor was not considered in relation to emissions from the disturbed burn area. This reduction factor may well be around a 20 to 30% reduction, but the mass loading in the RESRAD model was not modified to reflect this.

EXPOSURE FREQUENCY AND DURATION DISCUSSION

A total of six questions about exposure frequency and duration were discussed, with Kaiser Hill, CDPHE, and EPA providing technical responses. Questions were presented on the following topics:

- Duration for wildlife refuge worker,
- Exposure frequency and duration conservatism,
- Safety factors,
- Sensitive parameters and conservatism,
- RSAL and dose, and
- Source parameter.

Duration for Wildlife Refuge Worker

LeRoy Moore, RMPJC, asked what the assumed annual time onsite for a wildlife refuge worker is and what duration of time will the worker be outdoors.

CDPHE responded that the duration is evaluated based on 200 to 250 days per year. 200 days assumes a 50-hour workweek, four days a week, and 250 days assumes 50 hours with a five-day workweek. The model assumes that 50% of the time is spent outdoors, which is based on a Rocky Mountain Arsenal survey of outdoor workers. In terms of the duration, values range from zero to 40 years, with a mean value of 7.1. At the 95th percentile, duration is 14.8 years. These data were gathered from a study commissioned by the Rocky Mountain Arsenal, which included different wildlife refuges around the country.

EPA stated that these distributions are to be considered average, not maximum, total distributions.

Reed Hodgin, facilitator, clarified the point by stating that distribution is based on the results of all the calculations from all of the parameters combined.

Mark Sattleberg, U.S. Fish and Wildlife Service, stated that the arsenal studies have been reviewed and the distributions were found satisfactory.

Exposure Frequency and Duration Conservatism

Jerry Henderson, RFCAB, wanted to know if less conservative values were being used for exposure frequency and duration than for less important parameters, and if so, why.

Jerry further stated that important parameters, such as mass loading, are conservative due to the approach (using statewide and site-specific data) and the approach to temporal parameters, such as exposure frequency and duration, may be less conservative.

Kaiser Hill stated that the distribution for exposure frequency and duration for the wildlife worker is better known and can more precisely be characterized.

EPA said that the primary focus is to develop a technically defensible risk assessment, and to separate risk management from risk assessment. Where conservatism is

concerned, the standard of reasonableness is applied. As a result, the degree of conservatism is reflected in the confidence one has in any given parameter and its sensitivity.

Mark Sattleberg, U.S. Fish and Wildlife Service, commented that the duration of a refuge worker is perhaps four to seven years, due to the high turnover rate.

The Focus Group further discussed how worst-case assumptions would be perceived and how regional differences in mass loading relatively compare to localized differences in mass loading. Bob Nininger, Kaiser Hill, stated that as a result, a factor of 20 conservatism is built into the model taking into account exposure frequency, except for the resident scenario.

The City of Westminster stated that it is not unreasonable to request the most conservative risk assessment.

The Focus Group also discussed the potential distinction between plutonium concentration in the air and in the soil. Studies of resuspended aerosol in the Chernobyl area have found that there was enrichment of radionuclides on resuspended particles compared to soil. Kaiser Hill stated that there existed a 1:1 ratio of plutonium concentration in air and soil based on site-specific data. The RAGS and RESRAD use this 1:1 assumption.

Safety Factors

LeRoy Moore of the RMPJC asked if calculations used safety factors to account for uncertainties and limited knowledge in the modeling process. If so, what factor is used and how is it used in the calculation? If not, what is being done to account for the uncertainties and for what is not known?

Victor Holm, RFCAB, stated the Interstate Technology Regulatory Commission (ITRC), which is made up of state regulators, routinely set action levels conservatively. A report is being issued soon that evaluates risk assessment and the unbiased scientific approach, which does not build in conservatism. Conservatism speaks to risk management, which looks at safety factors.

EPA sets standards that protect at a reasonable maximum exposure at the 90th to 95th percentile.

Safety factors are considered after the calculations have been conducted and a distribution established, the safety factor is set at the 95th percentile or 10^{-4}, or due to further uncertainties a safety factor of 10^{-5} or 10^{-6} may be used. Managing risk basically involves picking within the risk range and then selecting the percentile from a probabilistic outcome. Safety factors are implemented during risk management, not during risk assessment.

Sensitive Parameters and Conservatism

LeRoy Moore of the RMPJC wanted a detailed explanation as to why the most conservative approach is or is not being taken for each of the most sensitive parameters. Further, he wanted to know if the differences could be shown between the most-conservative approach across the board and any other approach. Additionally, Leroy wanted to know what is meant by "an unrealistically conservative result." Leroy also asked how the agencies have decided to counter the conservative tendency for particular parameters, what counter measures have been taken and how the decisions were made regarding parameter selection for counter measures.

EPA reiterated that a conservative, technically defensible calculation is the task at hand. A worst-case scenario for every parameter results in hyper-conservatism and criticism that worst-case scenario development is contrary to EPA guidance. Further criticism will include that one has not followed proper risk assessment methodology, which will result in rejection.

The Focus Group further deliberated the intent of the conservative approach, the risk assessment, and how and when it is applied. EPA commented that the Task 3 report will include a discussion on all of the parameters and the rationale for declaring a distribution based on realism.

RSAL and Dose

John Ciolek, citizen asked that the assumptions be explained when establishing dose at 25mrem/yr for the RSAL.

EPA stated that it calculates the dose using the sum of ratios method.

Kaiser Hill stated that the dose correlates with the input parameters. This can be done as a deterministic sub data or can be input as a distribution. For example, a distribution would be evaluated at the 95th percentile. Mass loading uses the distribution method.

The Focus Group deferred the question and asked for a response from the regulatory community at a later date.

Source Parameter

John Ciolek, citizen, asked why the source is not a temporal parameter.

Kaiser Hill explained that the intent was to analyze the future and that that source was being treated as a temporal parameter.

Kaiser Hill further discussed the half-life of the sources in question (plutonium, americium, and uranium) and the decay chain resulting in daughter products. Kaiser Hill stated that the maximum ingrowth of americium into weapons grade plutonium has been potentially reached, whereby exponential decay will follow. For the purposes of this study, modeling has only been conducted to 1000 years.

FRAME THE POLICY DISCUSSION FOR NEXT FOCUS GROUP MEETING

The Focus Group discussed and listed policy questions, which include:

- Top down or bottom up approach?
- What is acceptable risk to the agencies and to the public?
- What is the process for picking the risk level?
- How does ALARA fit in?
- What is the right scenario to base the RSAL on?
- Should tiers be established?

Reed commented that the scenarios have already been established.

WIND TUNNEL PEER REVIEW PLANNING MEETING

AlphaTRAC was asked to coordinate a meeting with volunteers to plan the wind tunnel peer review.

ADMINISTRATION

The Focus Group decided to cancel the 10/31/01 RFCA Focus Group meeting. The principals' meeting is still scheduled for 10/30/01.

ADJOURN

The meeting was adjourned at 6:30 p.m.

RFCA Stakeholder Focus Group
September 5, 2001
Participants List

NAME		ORGANIZATION / COMPANY
David	Abelson	RFCLOG
Melissa	Anderson	RFCLOG
Christine	Bennett	AlphaTRAC, Inc.
John	Ciolek	AlphaTRAC, Inc.
Rick	DiSalvo	US DOE - RFFO
Shirley	Garcia	City of Broomfield
Joe	Goldfield	RFSALOP
Steve	Gunderson	CDPHE
Mary	Harlow	City of Westminster
Jerry	Henderson	RFCAB
Reed	Hodgin	AlphaTRAC, Inc.
Victor	Holm	RFCAB
Jeremy	Karpatkin	US DOE - RFFO
Ann	Lockhart	CDPHE
Carol	Lyons	City of Arvada
Tom	Marshall	Rocky Mountain Peace and Justice Center
LeRoy	Moore	RMPJC
Diane	Niedzwiecki	CDPHE
Tim	Rehder	US EPA
Carla	Rellergert	Weston
Kathleen	Rutherford	CDPHE/HMWMD
Mark	Sattelberg	US Fish and Wildlife Service
Kathy	Schnoor	City of Broomfield
Dave	Shelton	Kaiser-Hill Company, LLC
Carl	Spreng	CDPHE
Noelle	Stenger	RFCAB
Honorable Hank	Stovall	City of Broomfield

RFCA Stakeholder Focus Group
Meeting Agenda

When: **September 5, 2001 3:30 - 6:30 p.m.**

Where: **Broomfield Municipal Hall, Bal Swan and Zang's Spur Rooms**

3:30-3:40 Agenda Review, 8/8/01 Meeting Minutes Review, Objectives for this Meeting

3:40-4:20 Briefing on New Results in the RSAL Modeling Matrix
- New modeling results
- Sensitivity of results to key input parameters

4:20-5:00 RSALs Task 3: Continued Technical Discussion
- Mass loading questions
- Exposure frequency and duration
- Safety factors and conservatism
- Other technical questions from question list

5:00-5:10 Break

5:10-6:00 RSALs Task 3: Continued Technical Discussion
- Soil Ingestion Rate

6:00-6:20 Frame the Policy Discussion for Next Focus Group Meeting
- If technical discussion is completed

6:20-6:30 Set Future Agendas and Review Meeting

6:30 Adjourn

RFCA Stakeholder Focus Group
Meeting Agenda

RFCA Stakeholder Focus Group
Attachment A

Title:	Agenda for September 5, 2001 Focus Group Meeting
Date:	August 31, 2001
Author:	C. Reed Hodgin AlphaTRAC, Inc.
Phone Number:	(303) 428-5670
Email Address:	cbennett@alphatrac.com

RFCA Stakeholder Focus Group
Attachment C

Title:	RSALs Working Group Notes for August 23, 2001
Date:	August 30, 2001
Phone Number:	(303) 428-5670
Email Address:	cbennett@alphatrac.com

August 31, 2001

Dear Stakeholder:

The Rocky Flats Cleanup Agreement (RFCA) Stakeholder Focus Group will meet at the Broomfield Municipal Center at One DesCombes Drive on September 5, 2001 from 3:30 to 6:30 p.m.

The agenda for the September 5, 2001 meeting is enclosed (Attachment A). We will discuss the following topics:

- Briefing on New Results in the RSAL Modeling Matrix
  - New modeling results
  - Sensitivity of results to key input parameters

- RSALs Task 3: Continued Technical Discussion
  - Mass loading questions
  - Exposure frequency and duration
  - Safety factors and conservatism
  - Other technical questions from question list

- RSALs Task 3: Continued Technical Discussion
  - Soil Ingestion Rate

- Frame the Policy Discussion for Next Focus Group Meeting
  - If technical discussion is completed

The presentations from the August 22, 2001 RFCA Focus Group meeting are enclosed as Attachment B, including:

- Dose Contributions from Individual Exposure Pathways at 95% Probability – Preliminary,
- Technical Questions Regarding Task 3: Dose and Risk Model Parameters and Results, and
- Developing Probabilistic Inputs for the Rocky Flats Site, Susan Griffin's presentation.

The RSALs Working Group met August 23, 2001. The action items and notes resulting from the meeting are enclosed as Attachment C.

If you need additional information to prepare you for the Focus Group discussion on August 22, 2001, please contact Christine Bennett of AlphaTRAC, Inc. at 303 428-5670 (cbennett @alphatrac.com). Christine will help to find the appropriate resource for you.

You may call either Christine or me if you have any questions, comments, or suggestions concerning the RFCA Stakeholder Focus Group or the upcoming meeting.

Sincerely,

C. Reed Hodgin, CCM
Facilitator / Process Manager

Policy Q's

-Top –down or bottom – up approach?
What is acceptable risk?
    To agencies
    To public
What is process for picking risk level?
How does ALARA fit in?
What is the right scenario to base the RSAL on?
Tiers or not to Tiers
Categories of policy disc.
    Scenario
    Tiers
    Risk range
    The validation process

Actions due / Agenda Group discussion items from the 8/22/01 RFCA Focus Group Meeting

New RAC Task 3 report from John Till to Joe Goldfield

Paper / presentation on why distributions changed

Presentation of Sensitivity (importance) of Parameters

Safety factors

Task 3 Focus Group questions answered by agencies / DOE

Response to Peer Reviewer's Comments on the Rocky Flats Cleanup Agreement (RFCA) Radionuclide Soil Action Level (RSAL) Working Group (RWG)

Task 2 Report
Computer Model Selection

June 6, 2001

Received Comments from Four Peer Reviewers

- ✗ Two anonymous people hired by AlphaTrac
- ✗ Victor Holm (Received 9/12/00, response 9/28/00)
- ✗ LeRoy Moore

Two Anonymous Peer Reviewer's

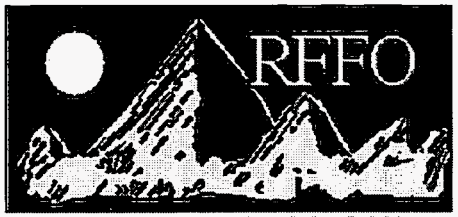
- ✗ First Reviewer's basic conclusion "The use of the newest version of RESRAD is sound and is justified by the analysis."
- ✗ Second Reviewer's basic conclusion "The overall approach is basically sound and appropriate, but there are two critical deficiencies."
  - ✓ The report ignores the CERCLA regulatory requirements for risk
  - ✓ The requirement that the model be in the public domain is unnecessarily restrictive

Agency's Comment - 1st Deficiency

- ✗ The Task 1 Report explains the roles of EPA and NRC
- ✗ Task 1 report says that any RSAL will have to meet the protective requirements of both the NRC and EPA
- ✗ The RSAL will be calculated using Dose and Risk

Agency's Comment - 2nd Deficiency

- ✗ Benchmarking is the industry standard for demonstrating a new computer codes validity
- ✗ Can only occur if the executable code is available in the public domain and available to many different users
- ✗ RAC precluded the use of MEPAS because it could not obtain code



Rocky Flats Field Office
Looking Toward the Future

Other Peer Review Findings

✗ Needs more background information

- ✓ Conceptual Site Model
- ✓ Explain Probabilistic vs. Deterministic
- ✓ Need for Executive Summary
- ✓ And the most important……

Criterion, not Criteria

Conclusion

- ✗ Will make revisions to add background information, explain more detail
- ✗ No major changes to Criteria
- ✗ Agency's proceeding using RESRAD 6.0 as the best computer code
- ✗ Final Task 2 Revision June 29, 2001

Response to Comments made by LeRoy Moore
On the Rocky Flats Cleanup Agreement (RFCA)
Radionuclide Soil Action Level (RSAL) Working Group (RWG
Task 2 Report Computer Model Selection

June 6, 2001

The following is the Agency's response to Comments made by LeRoy Moore of the Rocky Mountain Peace and Justice Center received May 24, 2001. Our response will be italicized.

The cover page of this report does not identify it as the RSAL Task 2 report. Nor is the author of the report anywhere named. I assume it is Russell McCallister only because we were told he wrote the initial draft. It would help to have both of these identifiers on the title page. It is also not clear whether this version of the report is supported by all the agencies or whether it represents the point of view of the author only.

Agency Response: The report will be modified to reflect that it is part of the RFCA RSAL review process, Task 2 and that the original was drafted by the Department of Energy and Kaiser-Hill. It will also reflect that it is a pre-decisional draft and not endorsed by DOE, EPA or CDPHE management.

This version differs only slightly from the original draft dated Oct. 26, 2000, and received by the Focus Group in late Nov. But slight changes in this version of the report make it's inherent weaknesses stand out. The following comments refer mainly to areas where some change has been made from the original draft.

2.3 Perhaps it is appropriate to refer to RESRAD 5.82 as modified by RAC as the "RAC Code, " but it seems something of an overstatement to assert that "the RAC developed computer model should not be considered associated with RESRAD' for the reasons cited. Since RAC launched its work from the platform of RESRAD 5.82, wouldn't it be more accurate and less abrasive to say: "RAC's modifications of RESRAD 5.82 do not have the endorsement of ANL; in ANL's view [if it its ANL's view--if not, whose opinion is this?], modifications made by RAC may have altered the initial integrity of the original RESRAD code." As is, this statement is an allegation with no demonstrated basis.

Agency Response: The language will be modified to say, "RAC's modifications of RESRAD 5.82 provide an air pathway calculation that differs from that of the original code. This modification constitutes a departure from RESRAD's formulation, in a manner that has not been fully documented.

4.1.7 The final sentence states that "the computer codes [for RESRAD 6.0} themselves can only be obtained with special permission from Argonne National Laboratory." Given the fact that Joe Legare has several times stated to the Focus Group that these codes would be provided for the current RSAL work, have they been requested? Have they

been received? Will they be made available to all stakeholders and specialists participating in the upcoming computer workshop? In sum, will it become possible to have an independent review of the guts of the RESRAD 6.0 codes?

Agency Response: The source code will not be made available. The executable code is available and has been provided to the various working groups. An independent review of RESRAD is being conducted, but will not available for six months.

4.3.2 through 4.3.6 These sections of the report provide the basis for the eventual negative evaluation of the "RAC Code" (as summarized in Table 1 on p. 20). To begin with, these sections state the author of the report [perhaps others] is unavailable to use RESRAD 5.82 as modified by RAC.

1) Was RAC asked to provide the technical assistance to help overcome this problem?

Agency Response: The RWG was not formed to assist vendors to develop code for its use; the RWG was formed to review any new information that might require a change to the RSALs. The group chose to seek existing codes that could assist in this purpose. The RAC's contract was with the RSALOP/RFCAB. It would be inappropriate for the RWG to request additional work from RAC. The RAC Code is not readily available for use, nor is it documented and benchmarked, as were the other candidate codes.

2) Was RAC told what criteria would be utilized to evaluate RAC's computer work?

Agency Response: None of the potential providers, including RAC were consulted regarding the selection criteria. The criteria developed as part of the Task 2 Computer Evaluation were developed independent of questioning any provider's ability to meet them.

3) Was RAC given an opportunity to meet said criteria?

Agency Response: The issue is availability of existing codes, not the ability to develop codes and documentation to meet custom needs. None of the potential providers were asked to modify their codes to meet the criteria established for this evaluation.

4) Was RAC told that their work would be downgraded (as per 4.3.3) if they had not documented how and why they modified RESRAD 5.82 in peer-reviewed journals?

Agency Response: It is common practice in industry to document computer code in a manner sufficient for others to use and understand its uses and limitations. The RWG had no obligation or need to contact code providers with its selection criteria prior to the evaluation: the RWG chose to evaluate codes whose bases were well proven. RAC was not told by the RWG, nor were any other vendors, that the NRC developed a regulatory guide, "Demonstrating Compliance with the Radiological Criteria for License Termination" (DG-4006)(1998) that explains the acceptance criteria for selection of site-specific codes/models at nuclear facilities. The guidance explains that software used

must in be conformance with the recommendations of the Institute of Electrical and Electronics Engineers (IEEE) Std.830-1984, Guide for Software Requirement Specifications. This is the industry standard for the development/modification of computer software and should be known companies doing that type of work if their code is to be readily accepted and used by the nuclear community.

5) In RAC's original work for the RSAL Oversight Panel, RAC was expected to calculate a scientifically defensible RSAL. They were asked to select a computer code for their work; they were not asked to produce a computer code or a modification of a computer code that would satisfy the several criteria spelled out in this report. Isn't it inappropriate to judge RAC's computer work by criteria it was never asked to meet in the first place?

Agency Response: The RFP issued to review the RSALs at RFETS dated June 1, 1998 had as it's purpose "...to conduct an independent scientific review of the RSALs established to cleanup RFETS. The review will evaluate the methods used as well as the accuracy and applicability of the input parameters used to calculate the current RSALs. The review will also encompass models, methodologies, and cleanup standards that may exist or are being for other sites..." The fact that RAC went beyond selecting a model that had been validated and verified was their decision. In the RFP section IV, Project Description and Scope, page 5, Computer Models, requires "Whichever model or models are recommended should be thoroughly validated. It is not necessary that the contractor perform this validation, peer reviewed, published studies will suffice". There is nothing in the Task 2 report that is not industry practice for selecting/modifying or using computer software. The selection criteria were developed by the RWG independently of any previous work done on the RSALs. The fact that RAC's work did not produce an acceptable code under these criteria does not denigrate the work RAC did, nor the value obtained from the code execution and resultant discussions. RAC's work was not judged in this selection process.

6) Should not this portion of the report be deleted and replaced by some discussion of RAC's work that adheres more closely to the facts of the matter?

Agency Response: The Task 2 Report is not intended to be review of RAC's work. The DOE requirements for cleanup of residual radioactive material (including soil) are contained in DOE Order 5400.5, Chapter IV. To be found acceptable for computing cleanup levels for radioactively contaminated soil, the computer code must meet specific regulatory criteria. The criteria the RWG developed was designed to meet those criteria and cannot be ignored.

7) If what is suggested in question 6 is done, would it not be pertinent to indicate how and why RAC modified RESRAD 5.82, then consider whether what RAC did should be incorporated into computer work now being contemplated?

Agency Response: The Agencies are proceeding using RESRAD 6.0 to calculate an RSAL. The RAC work contributed valuable information and insight that is being

considered and incorporated into the ongoing discussions of parameter inputs. If the Stakeholder Focus Group or some other group wants to explain how and why RAC modified the inputs to RESRAD, that might be an appropriate presentation to the Focus Group. The results of the recent workshop, however, seem to provide adequate evidence that the RAC Code did not result in significantly different results than would be obtained with RESRAD 6.0, assuming the same parameter inputs. The issues of greatest importance and controversy seem to occur in the area of parameter selection and application.

In conclusion to the foregoing, this report seems to confuse two things: deciding which computer code is best to use for current calculations of the RSALs, and assessing how RAC used RESRAD 5.82. The first can be done without looking at RAC. The second, which is really not done here, must be done somewhere, perhaps in the parameter paper. Still, this report should at least refer to how RAC used RESRAD 5.82, since a discussion of this issue would help clarify modifications that may need to be made to RESRAD 6.0, if this is the model being used for current calculations.

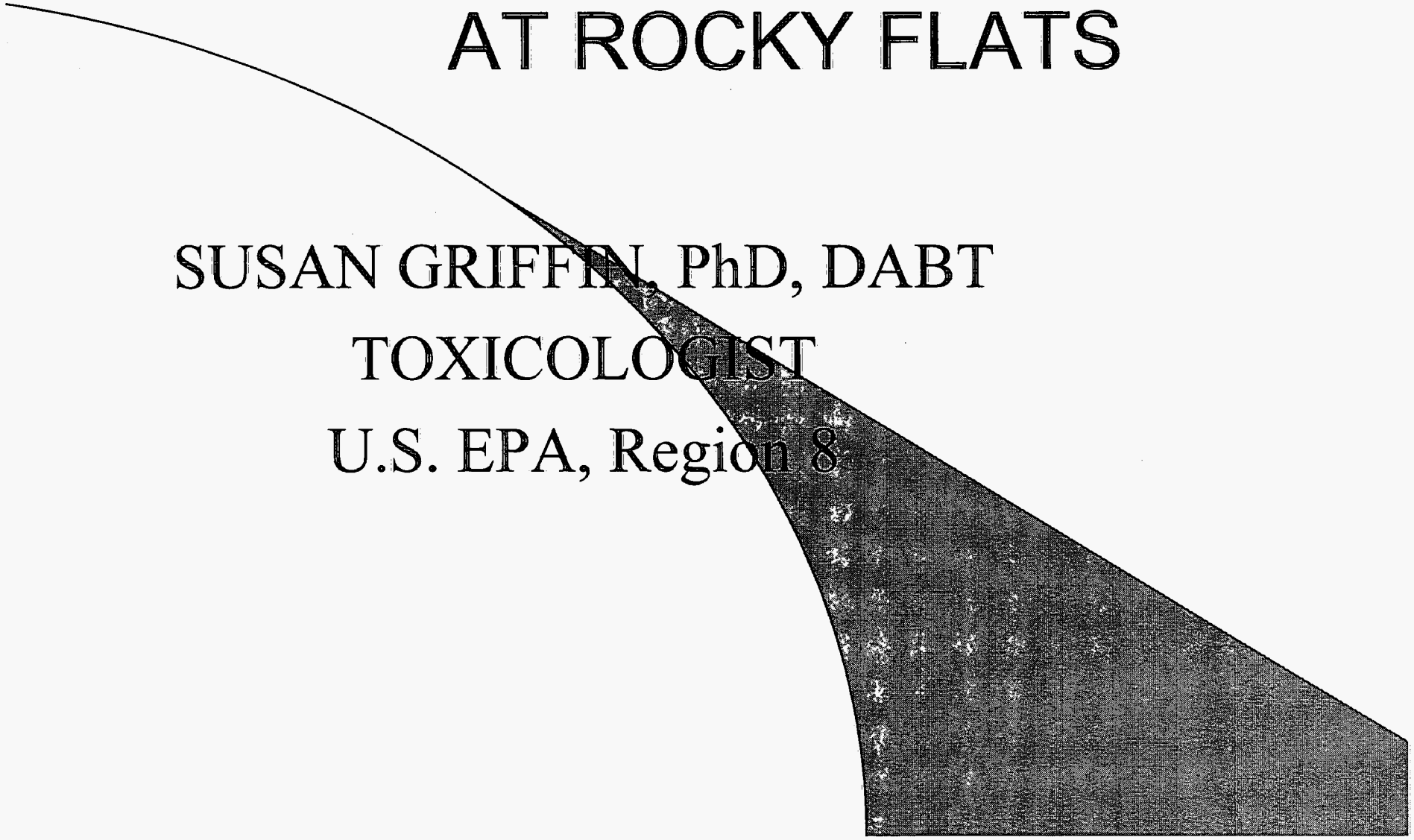
Agency response: The RWG has decided, based on current information that RESRAD 6.0 is the best computer code to proceed with. The group based this decision on the Task 2 criteria, and considered the available codes that might be acceptable, including the RAC Code. Assessing how RAC modified and used RESRAD is not a RWG responsibility, nor is it the subject of future planned reports.

On p. 19 there are two minor matters of wording. First, the final phrase of the first long paragraph contains no subject for the verb; what exactly is intended here? Second, on line nine of the final long paragraph, what precisely is meant by "EPA's proposed cleanup rule"?

Agency Response: The intent was to explain that from the comparison done by Radian between RESRAD 6.0 and RAC Code, the computer codes generate similar RSALs if similar parameters are used. The language will be changed to reflect this.

DEVELOPMENT OF RISK-BASED SOIL ACTION LEVELS AT ROCKY FLATS

SUSAN GRIFFIN, PhD, DABT
TOXICOLOGIST
U.S. EPA, Region 8



Dose vs. Risk

- Absorbed Dose
  - Mean energy imparted by ionizing radiation to matter per unit mass (D=e/m)
- Risk
  - An estimation of the qualitative and quantitative potential (expressed as a probability) for an event to occur. (i.e., a one in a million probability of an individual coming down with cancer)

Dose vs. Risk

- Dose
  - A dose equivalent (such as 15 mrem) needs to be placed within the context of existing information relating dose with known cancer effects
  - Risk
    - Risk already includes a comparison between site-specific exposures and a known toxicity benchmark
  - EPA is required to perform an evaluation of risk at all CERCLA sites

Risk Assessment Guidances For Superfund

- National Academy of Sciences. 1983. *Risk Assessment in the Federal Government: Managing the Process*
- U.S. EPA. 1989. *Risk Assessment Guidance for Superfund: Volume 1. Human Health Evaluation Manual*
- U.S. EPA. 1991a. *Human Health Evaluation Manual, Part B. Development of Risk-based Preliminary Remediation Goals*
- U.S. EPA, 1991b. *Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors*
- U.S. EPA 1992. *Guidance on Risk Characterization for Risk Managers and Risk Assessors*

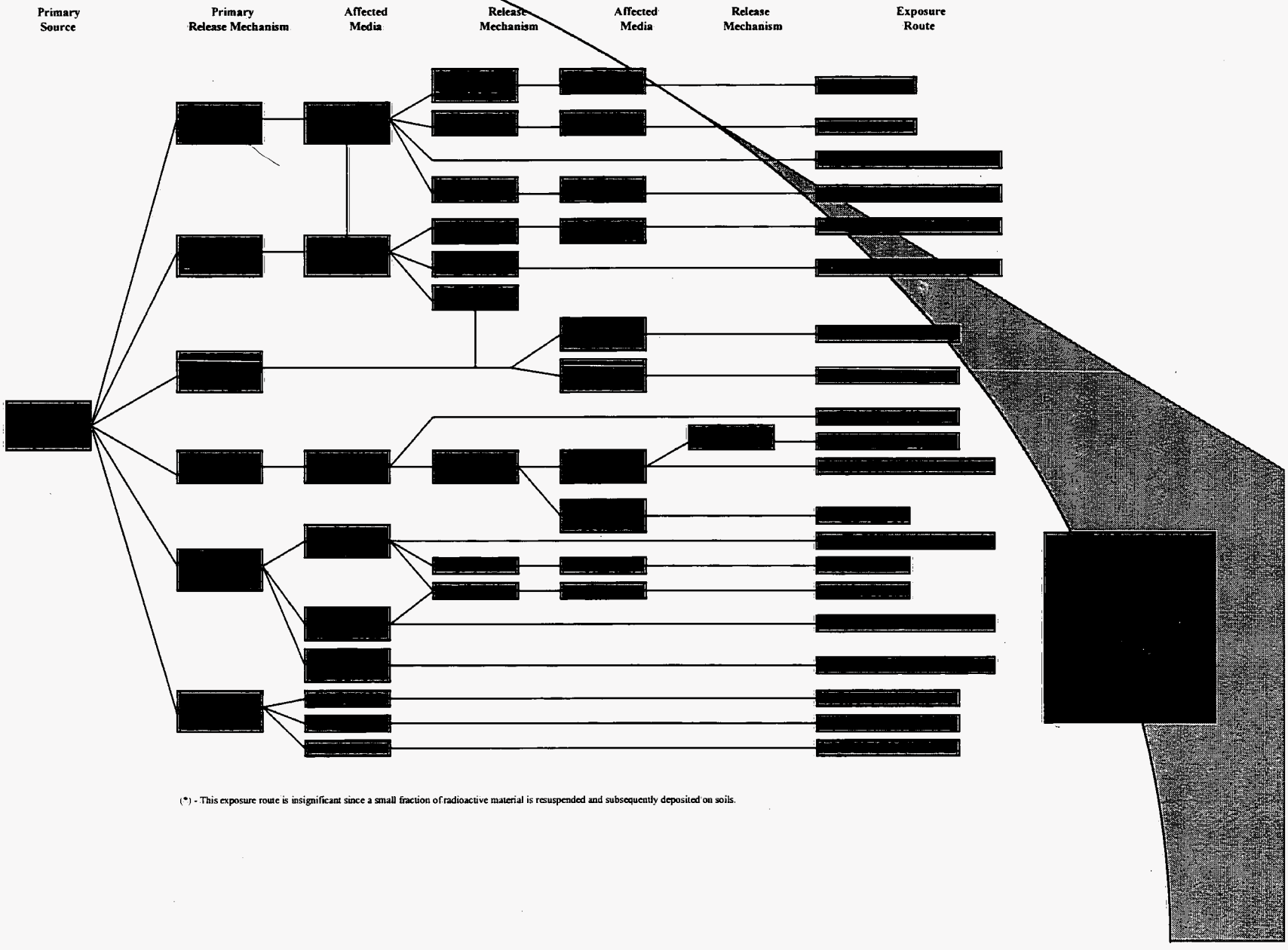
Site Conceptual Models

- Risk assessments are expected to look at both current and probable future land uses at a site.
  - Once the risk assessment is completed, risk decision makers (including stakeholders) will choose the most likely land use and the appropriate remediation strategy

Site Conceptual Models

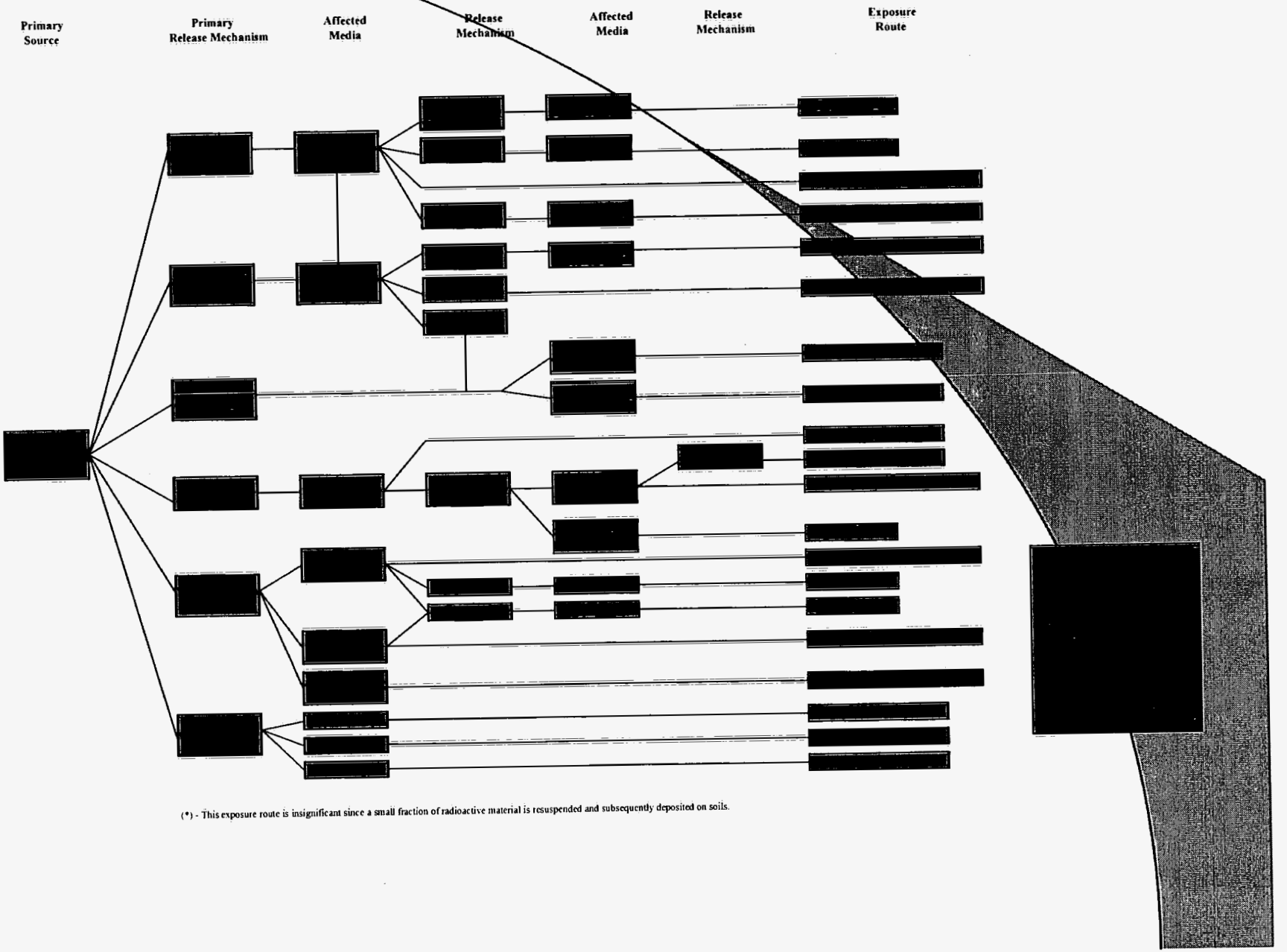
- Definition of a site conceptual model
  - A graphical illustration of where the contamination originates, how it moves through the environment, and how humans come into contact with the contaminated media
- Value of a site conceptual model
  - Illustrates which pathways are important (and which are not)
  - Illustrates which pathways are complete
  - Guides and focuses data collection
  - Illustrates where remediation efforts will be most effective

Residential Site Conceptual Model



(*) - This exposure route is insignificant since a small fraction of radioactive material is resuspended and subsequently deposited on soils.

Wildlife Worker



(*) - This exposure route is insignificant since a small fraction of radioactive material is resuspended and subsequently deposited on soils.

Exposure Assessment

Definition

Estimation of the magnitude, frequency, duration, and routes of exposure

- Routes of exposure
- Ingestion of soil/sediment
- Ingestion of homegrown produce
- Inhalation of particulates
- External gamma irradiation

Exposure Assessment

Assessing magnitude and duration of exposure

Ingestion of radionuclides in residential soil

$$PRG = TR/SF \times IR \times 1x10^{-3} \times EF \times ED$$

PRG = preliminary remediation goal

TR = target cancer risk

SF = soil ingestion slope factor

EF = exposure frequency

ED=exposure duration

EXPOSURE ASSESSMENT

- External exposure to radionuclides in soil

- $PRG = TR/Sf_e x(EF/365)xEDxACFx [ET_o + (ET_i xGSF)]$

- PRG = preliminary remediation goal
- TR = target cancer risk
- SFe = external slope factor
- EF = exposure frequency
- ED = exposure duration
- ACF = area correction factor
- ETo, ET_i = exposure time fraction outdoors, indoors
- GSF = gamma shielding factor

EXPOSURE ASSESSMENT

- What values are input to the parameters?
  - CERCLA law requires EPA to base human health remedial decisions on an estimate of the Reasonable Maximum Exposure (RME)
  - The intent of the RME is to estimate a conservative exposure case that is within the range of possible exposures
  - If adequate site-specific data is available it should be used in the exposure assessment
  - If not, EPA recommends the use of standard RME default values (USEPA, 1991a)

TOXICITY ASSESSMENT/ RISK CHARACTERIZATION

- The preliminary remediation goal includes a toxicity benchmark (i.e., cancer slope factors) in addition to the exposure assessment
- Cancer slope factors for radionuclides represent lifetime excess cancer risk per unit intake (risk/pCi)
- Slope factors are available for the ingestion, inhalation, and external exposure pathways
- Updated slope factors are available on EPA's web site

RISK CHARACTERIZATION

Risk is described as a probability of coming down with cancer over a lifetime as a result of chronic exposure to a contaminant

Risk can be expressed as a one in a million chance of cancer, as a 0.000001 chance, or in scientific notation 1×10^{-6}

In the Superfund program action is typically not warranted unless cumulative carcinogenic risks exceed 1×10^{-4}, unless there are adverse environmental impacts or ARARs are exceeded (USEPA, 1991b)

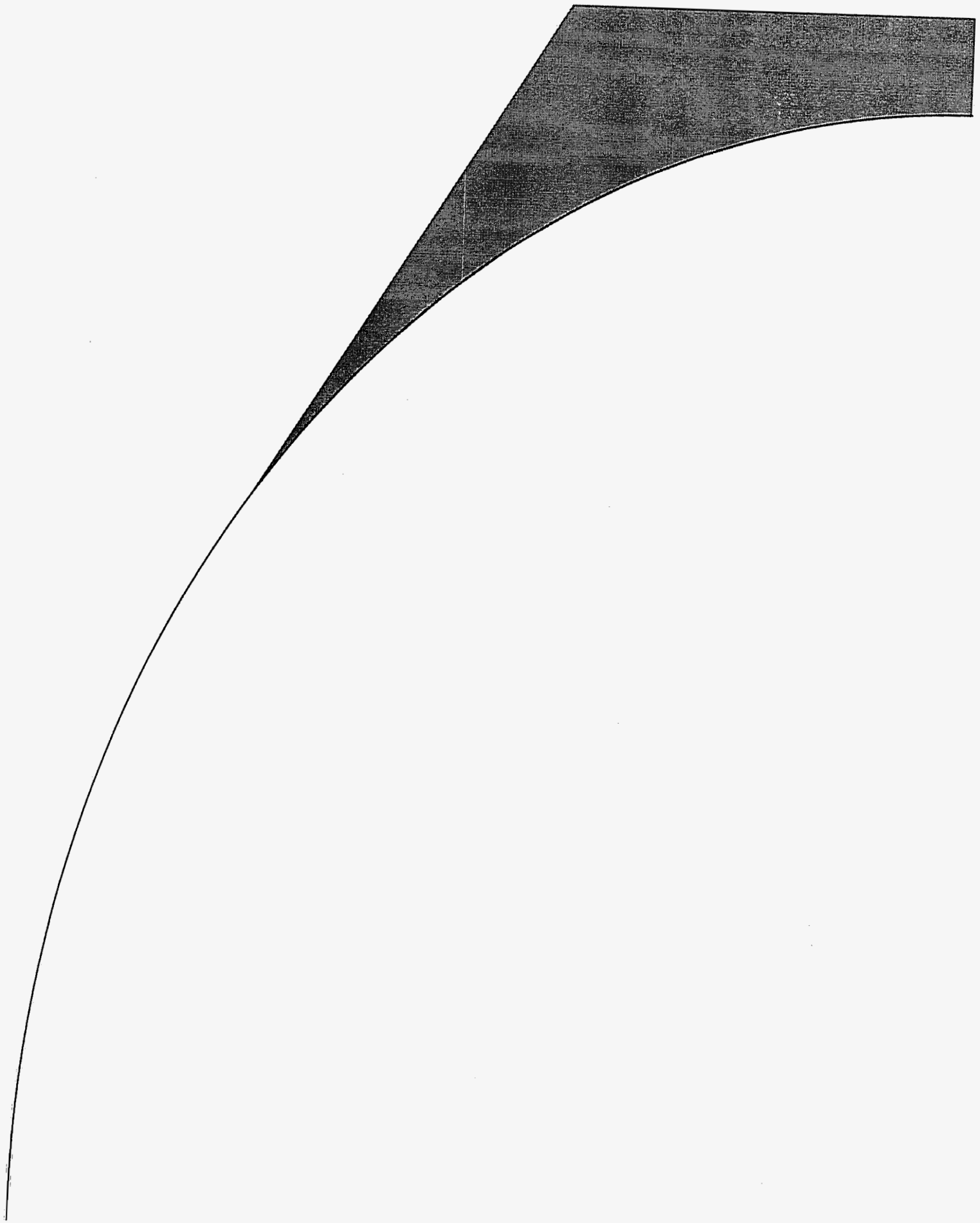
State regulatory agencies may have other programmatic guidance

RISK CHARACTERIZATION

In addition to a quantitative estimate of risk, an assessment should discuss what we know, what we don't know, and how it impacts the outcome(e.g., Does the model include the pathways of exposure and exposed populations at a site? What are the limitations of the data used to develop parameter inputs?

SUMMARY

- Development of preliminary remediation goals begins with the site conceptual model
- Equations and models should include all complete and significant exposure pathways identified in the site conceptual models
- In a point estimate approach, inputs to the parameters should represent an RME individual
- In addition to a quantitative estimate of risk, the uncertainty surrounding the risk estimate should be discussed



TYPES OF MODEL INPUTS

- Model: $Y = f(A,B,C,D)$
- A, B, C, and D are model inputs
- Each input can be either
  - Constant
  - Variable

BODY WEIGHT OF MEN
Summary Statistics

N = 1000

Mean = 69.7 kg

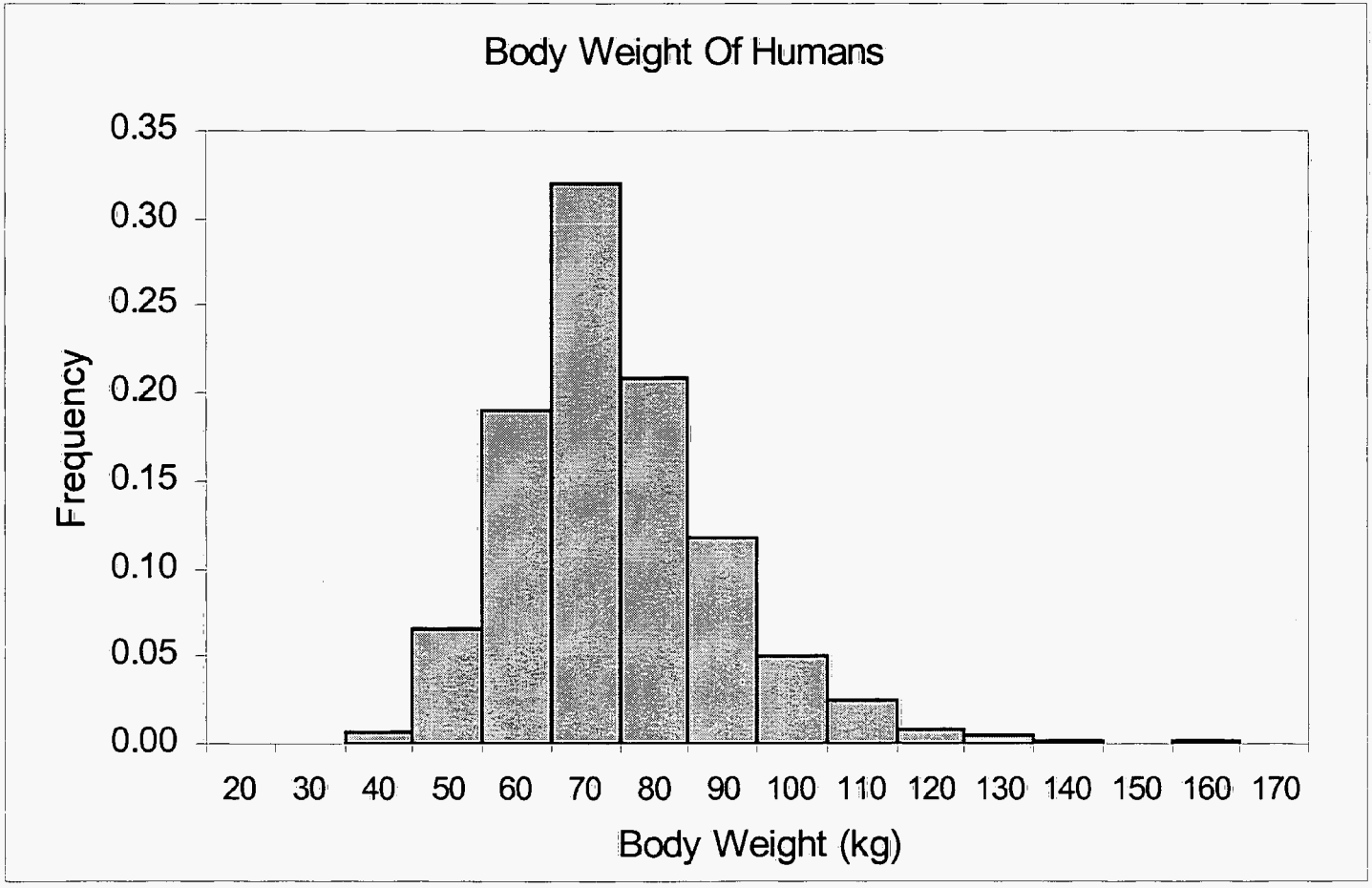
Stdev = 15.2 kg

Min = 38 kg

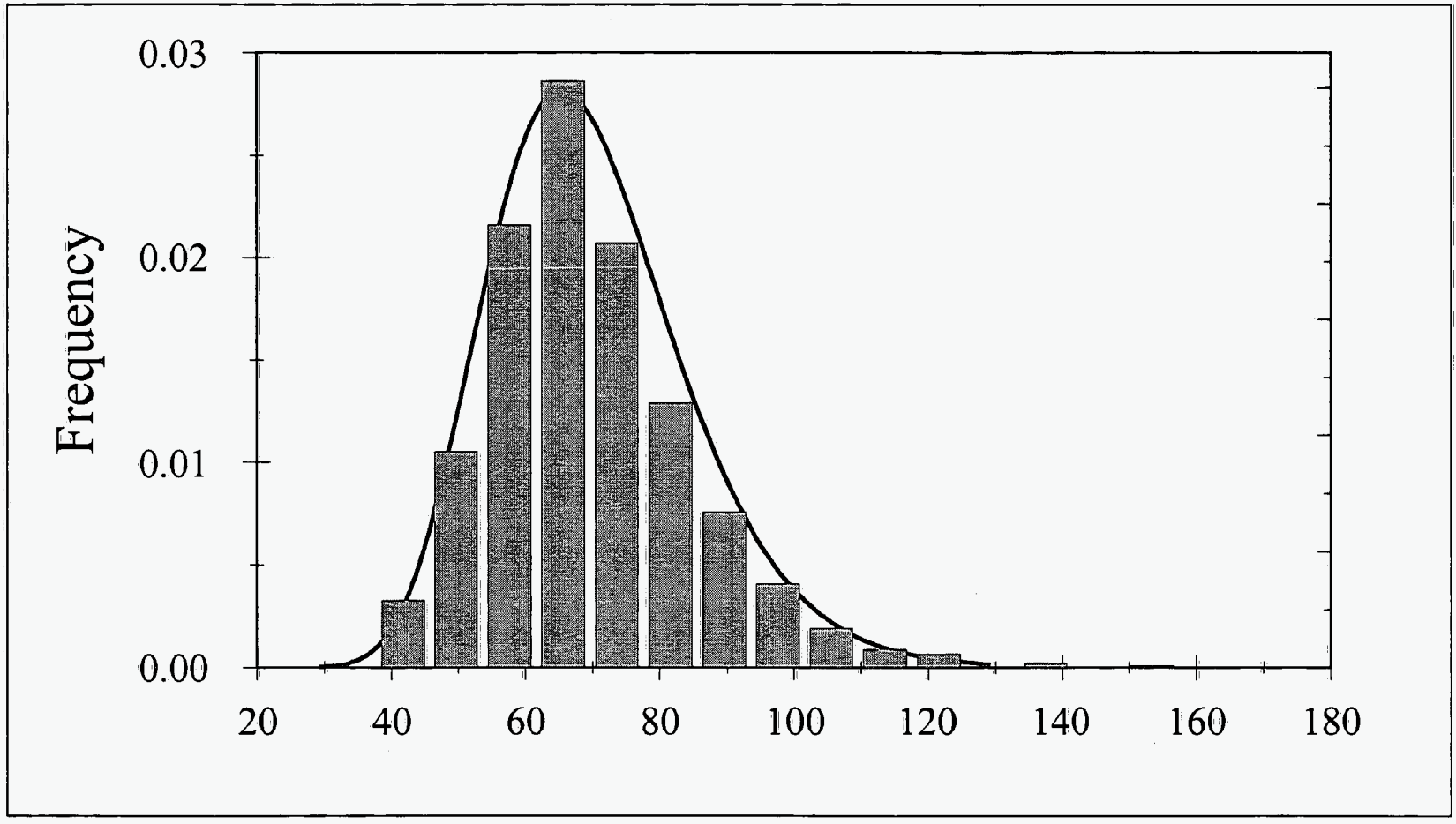
Max = 157 kg

95th percentile = 98 kg

BODY WEIGHT OF MEN
Histogram

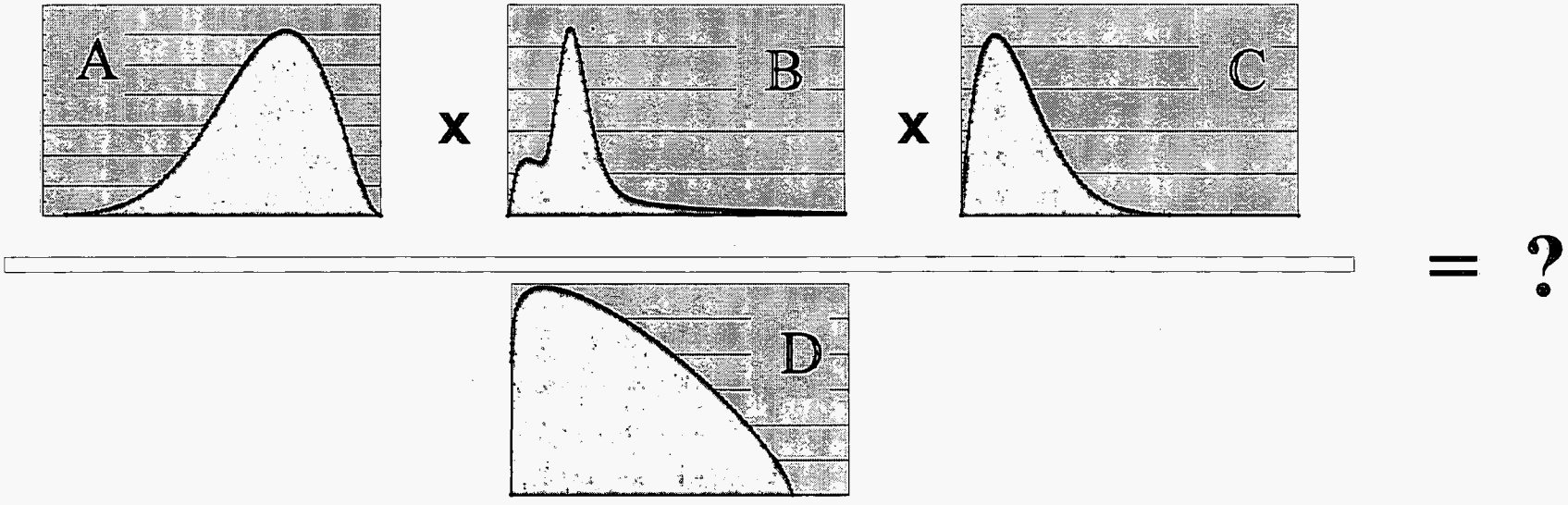


BODY WEIGHT OF MEN
Probability Density Function

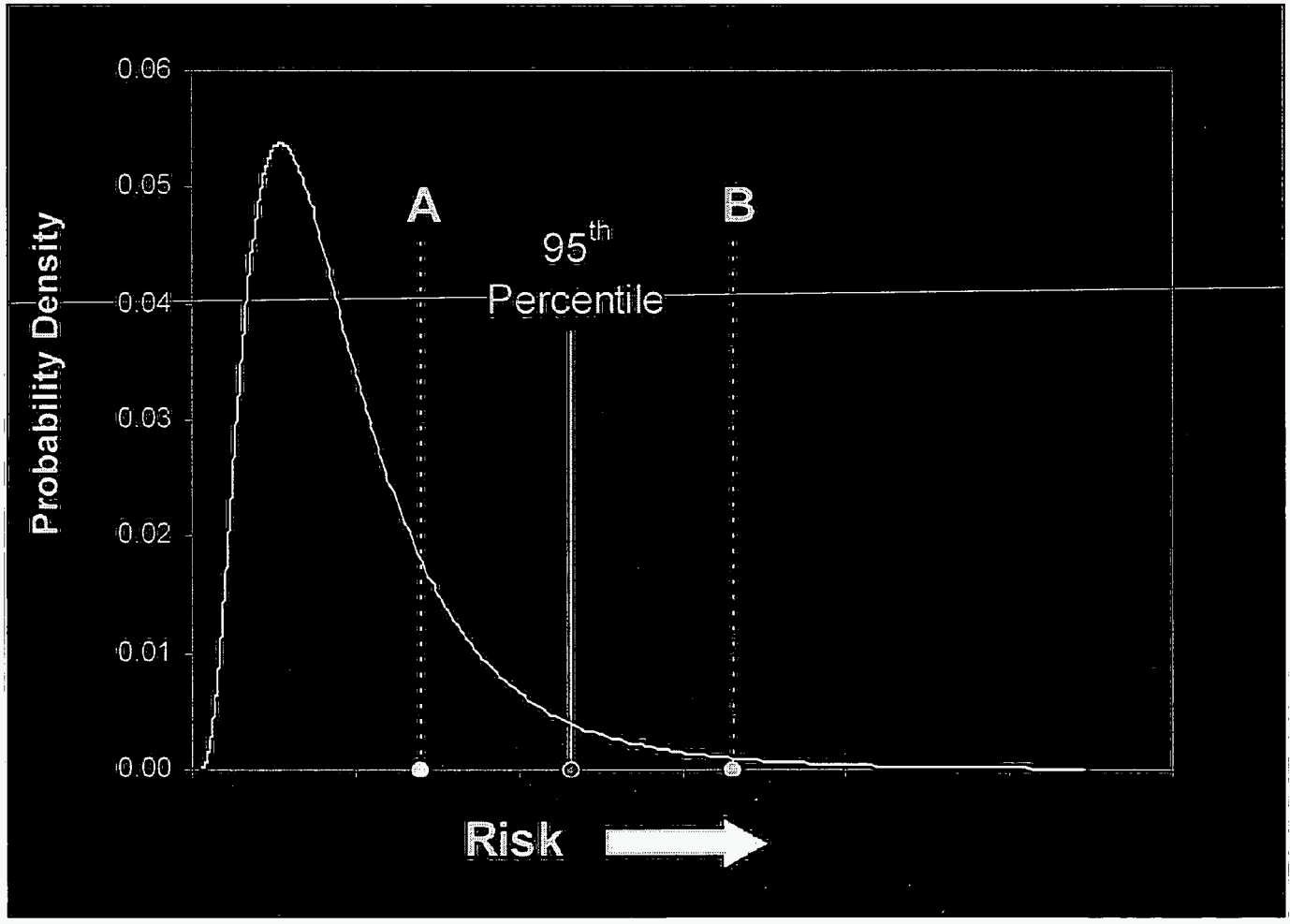


Problem: How Do You Get the Result?

$$Y = \frac{A \; B \; C}{D}$$



Does the RME Risk exceed the Target Risk?



Advantages and Disadvantages of Point Estimate Approaches

Advantages	Disadvantages
Uses conservative assumptions to ensure protection of human health	Results in a single point estimate of risk, which may be viewed as a "bright line"
Useable as a screening method	Provides little insight regarding variability and uncertainty in risks
Employs consistent approach and standardized reporting methods	Provides fewer incentives for collecting better or more complete information
Easily understood and communicated	Addresses uncertainty in a qualitative manner
Requires less time to complete; not resource intensive	Uses less information on exposure and toxicity, which may lead to greater uncertainty
Based on standard equations and exposure assumptions	

POINT ESTIMATE APPROACH
Upper Bound (RME)

Assume target RME = 95th percentile
(this is a risk management choice)

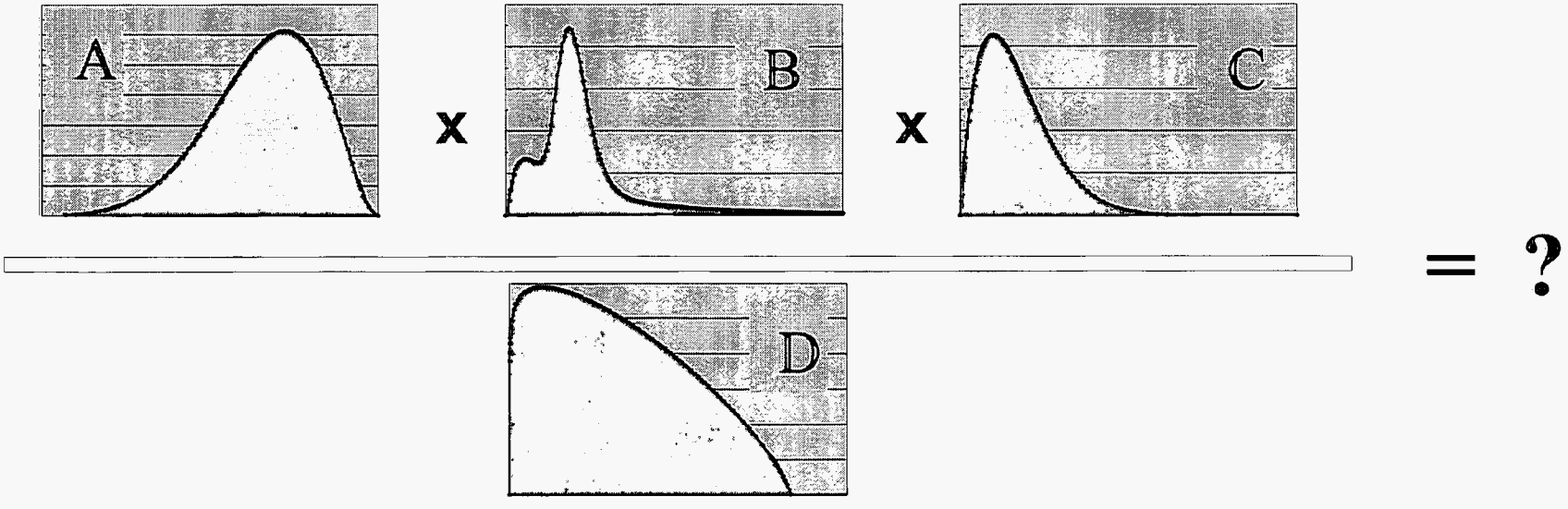
How do you calculate the 95th?

$$Y_{95} \neq f(A_{95}, B_{95}, C_{95}, D_{95})$$

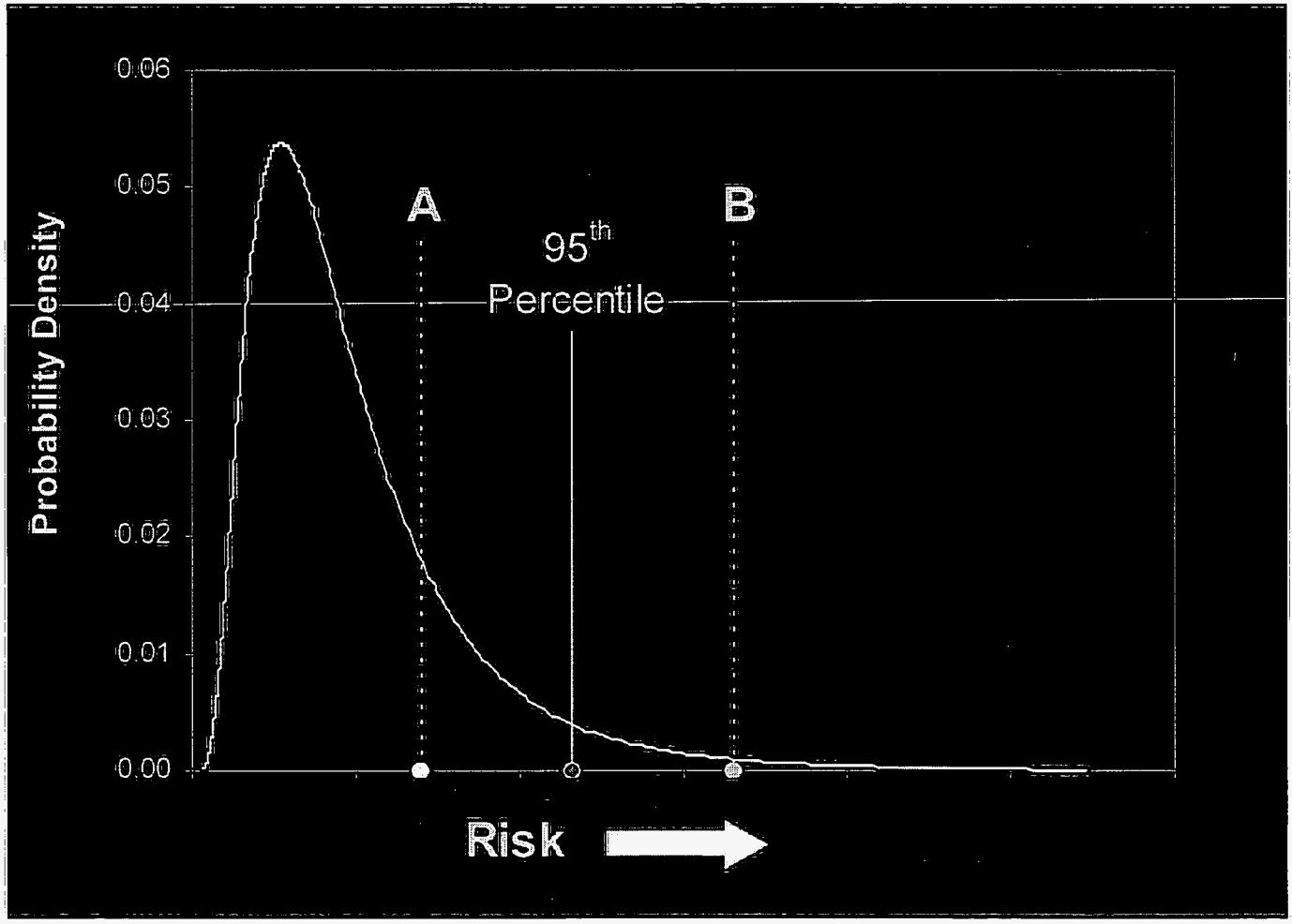
$$Y_{95} \approx f(A_{mean}, B_{95}, C_{mean}, D_{95}) \quad (maybe)$$

Problem: How Do You Get the Result?

$$Y = \frac{A \; B \; C}{D}$$



Does the RME Risk exceed the Target Risk?



Advantages and Disadvantages of Probabilistic Approach

Can make more complete use of site data to characterize variability and uncertainty in risk	Sufficient information may be lacking on variability and uncertainty for important exposure variables
Quantitative data on the uncertainty in exposure variables can be modeled and may support statistical confidence limits on risk assessments	May require more time and resources to select and fit probability distributions
Sensitivity analysis can identify pathways and parameters which strongly influence the risk outcome	May convey false sense of accuracy unless the exposure models and distributions are representative of site conditions
Can identify data gaps for further evaluation/data collection	May introduce inconsistency in risk estimates across sites due to different choices of distributions and risk percentile

RFCA STAKEHOLDER FOCUS GROUP

TECHNICAL QUESTIONS REGARDING TASK 3: DOSE AND RISK MODELING PARAMETERS AND RESULTS

August 22, 2001 Focus Group Meeting

SOIL INGESTION

Annual soil ingestion rates for a child at or near zero seem to be included in the distribution. How is this appropriate for a child playing outdoors in the warmer months? Are there data to support the conclusion (Henderson)?

Is there a consensus among professionals on how best to meet the challenge of limited data on which to base adult soil ingestion factors (insufficient data to use a distribution)? Has the Working Group compared their approach with other sites where a soil-intrusive scenario was used to determine the cleanup level (Henderson)?

PLANT UPTAKE

How has plant uptake of Americium been considered in the modeling (Harlow)?

Is Pu and Am transport in algae leaving the site in/on surface water being considered (Harlow)?

How has the biological availability and mobility of Am in soil systems been considered (Harlow)?

How have differences in uptake between native grasses and other plants been considered (Harlow)?

How has the effect of weathering on plant uptake been considered (Harlow)?

MASS LOADING

Is a sophisticated dust resuspension model being developed for the Actinide Migration Evaluation work? If so, could it be used to benchmark the RSAL results for the inhalation pathway (Henderson)?

Please explain and provide the rationale for the approach being taken regarding the frequency of a major grass fire at Rocky Flats (in comparison to the approach used by RAC) (Moore).

Given that the wind tunnel technology, including its methods of measurement or calibraton, has not been peer-reviewed, what data are being used for the fire calculation? If the peer reviewing cannot be completed in time, what will the agencies do? If the peer reviewing suggests major changes must be made in the wind tunnel technology before it can produce reliable results, what will the agencies do? If the peer reviewing concludes that the wind tunnel technology cannot produce reliable data for the RSAL calculations, what will the agencies do (Moore)?

What are the diurnal variations in particulate concentration? Do your exposure scenarios adequately account for the increased concentrations that occur when the receptor is predominantly being exposed? (Ciolek)

Provide all data used to come up with the "seed" value for the mass loading. Explain why higher averaged values were dismissed (Ciolek).

Why does the function used in the Monte Carlo simulation of adult soil ingestion use a maximum value of 100 mg/day when the mean and median values in the Calabrese 1990 study occur at or above 100 mg/day in 3 of the 12 experiments (Ciolek)?

How was the enhancement factor for topsoil disturbance chosen and why is it appropriate (Ciolek)?

Show how you have incorporated the effects of mechanical disturbance of soil in your mass loading calculations. How does it match the effects of mechanical plowing/tilling, construction, road traffic,

localized digging, etc. (Ciolek)?

EXPOSURE FREQUENCY AND DURATION

What is the assumed annual time on site for the wildlife refuge worker? How much of this time is assumed to be spent outdoors? What duration (number of years in this work at RF) is assumed (Moore)?

Are less conservative values being used for exposure frequency and duration than for less important parameters, and, if so, why is this appropriate (Henderson)?

MODELING METHODOLOGY

Show how you came up with the RSAL based on the "not to exceed 25-mRem/yr dose" (including all assumptions) (Ciolek).

Explain why the source is not a temporal parameter (Ciolek).

What is the influence precipitation events have on the final RSAL and how would that change if you looked at a larger statistical sample of climate along the Front Range (Ciolek)?

How are possible dependencies (correlations) between parameters being considered in the modeling (e.g., higher breathing rates when soil is being disturbed) (Ciolek)?

Are the agencies in their present calculations using a
Safety factor to account for uncertainties and limited knowledge in the modeling process? If so, what factor is used and how is it employed in the calculation? If not, what is being done to account for the uncertainties and for
what is not known (Moore)?

Please explain in detail why the most conservative approach is or is not being taken for each of the most sensitive parameters. Are you able to show the

difference between a most-conservative approach across the board and any other approach? Explain what is meant by "an unrealistically conservative result." (per Bob Nininger at 8/8 Focus Group meeting). If the agencies have decided to counter the conservative tendency for particular parameters, what counter measures have they taken? How have they decided what measures to take? How have they decided which parameters to select for such counter measures? Why will the end result be anything other than an unrealistically non-conservative result (Moore)?

TREATMENT OF AMERICIUM

According to RESRAD, radiation exposure decreases over time. Please explain and show how and why this is true of Pu in the RF environment (regarding ingrowth of Am over time) (Moore).

POLICY QUESTIONS

What are the nine CERCLA criteria to consider in making cleanup/remediation decisions (Moore)?

Why are modeling calculations being performed for multiple scenarios if the agencies are going to use only the wildlife refuge worker scenario in setting the RSAL (Moore)?

What criteria will the agencies employ in making a selection among the results for use in the final RSAL (Moore)?